REMARKS/ARGUMENTS

Reconsideration of the above-identified application is respectfully requested in view of the foregoing amendments and the following remarks. Claims 1, 6 - 8, 10, 11, 13, 16, 18 - 19, and 78 - 80 have been amended. Claims 1, 5 - 11, and 13 - 81 remain in the case.

The claims of the invention are drawn to a system and method for reliably and efficiently transporting data in a communications network. The inventive method is particularly useful in a low grade communications network where frequent retransmission of data is required. A novel method of issuing credits from a receiver to a sender is used, wherein rather than the issued credit indicating merely a number of bytes that may be transmitted, the credits indicate specific ranges of bytes to be transmitted. Failure of a credit packet to arrive at the sender does not necessarily impede the overall data communication process as the sender may infer credits for earlier ranges of bytes upon receipt of a credit for a later range of bytes. In addition, a unique application of a negative acknowledgement (NAK) system minimizes the number of bytes that must be retransmitted when an error is detected. Unlike systems of the prior art that typically require transmission of complete blocks of data, only retransmission of missing or corrupt bytes is required. Using implications arising from the novel credit system, the number of bytes that must be retained in a buffer at the transmitter following transmission is also reduced, thereby improving economy because of reduced buffer sizes.

In the networking and data communications arts, two relevant terms are commonly used. The first terms is byte stream, commonly used to refer to a sequence of bytes, numbered sequentially from an initial number. The second term is byte range, a sequence of some consecutively numbered bytes within the byte stream being transmitted or received. In accordance with industry practice, Applicants use the term

range or byte range to refer to such a unique, sequentially numbered sub-string of bytes.

Claim 19 was objected to as containing a typographical error. Claim 19 has been amended to correct the typographical error, thereby overcoming the objection.

Claims 1, 6 - 15, 77, 78, and 81 were rejected under 35 U.S.C. §102(e) as being anticipated by United States Patent No. 6,594,701 for CREDIT-BASED METHODS AND SYSTEMS FOR CONTROLLING DATA FLOW BETWEEN A SENDER AND A RECEIVER WITH REDUCED COPYING OF DATA, issued July 15, 2003 to Alessandro Forin. FORIN teaches a system wherein credits issued by a receiver are used to control transmission of data from a transmitter to a receiver. However, in the FORIN system, the credits specify only the number of bytes that may be transmitted and do NOT identify a particular sequence (i.e., range) of bytes in a data stream. This approach has many limitations that are overcome in the novel approach of the present invention.

Applicants' novel system, on the other hand, issues credits uniquely associated with a particular range of bytes (i.e., a particular sub-string) of the stream of bytes to be transmitted. In other words, the FORIN system sends credit for the transmission of, for example, 100 bytes of data. Typically, in such systems, the next 100 bytes from the current location of a pointer in the byte stream will be transmitted. Applicants, on the other hand, send credits that specify not only that 100 bytes of data be transmitted, but specify that, for example, bytes 84 - 183 be transmitted.

With respect to claim 1, the Examiner states that "FORIN teaches a method for quickly and reliably transmitting a byte stream from a sending node to a receiving node in a data communication network, the method comprising:

a) initially transmitting a predetermined number of credits from a receiving node to a sending node, said initially transmitted credits authorizing transmission from

said sending node of a first unique range of bytes of a byte stream (column 22 lines 25 - 35)"

FORIN (column 22, lines 25 - 35) recites: "The sender initially has zero credits. In row R1, column C1, the receiver has two available receive buffers 78(a) and 78(b) of **size** three bytes and seven bytes, respectively. In row R1, column C2, the receiver 62 sends a credit message 82(a) to the sender 60 indicating the **size** of the buffers 78(a) and 78(b). The sender maintains two pointers, Rtrip and Next. Rtrip points to the first buffer indicated in a credit message sent to the sender. The pointer Next points to the first receive buffer not communicated to the sender in a credit message." [emphasis added] Nothing therein teaches or implies that credits for a SPECIFIC range of bytes (i.e., a unique sub-string) have been sent or received. FORIN issues credits indicating only the size of an available receive buffer. This, FORIN fails to teach a critical step of Applicants' process.

The Examiner further states: "b) transmitting said first unique range of bytes of said byte stream from said sending node to said receiving node (column 22, lines 45 - 67)".

FORIN (column 22, lines 45 - 67) recites:

"In row R2, column C3, the credit list reader/processor 75 of the sender receives the credit message 82(a) and adds credits of three and seven to the credit list. The credit list reader/processor 75 posts a first descriptor to the send queue of the sender to send the first three bytes of the send buffer 68(a) and updates the buffer pointer PB to point to the next byte to be sent.

"In row R3, column C2, the sender sends a data packet 84(a) containing the first three bytes of the send buffer 68(a) to the receiver. In row R3, column C3, the credit list reader/processor 75 removes the used credit of three from the credit list, posts a descriptor in the send queue to **send the next seven bytes of the send buffer** 68(a) and updates the

buffer pointer PB. The shaded bytes in the send buffer 68(a) indicate data that has been sent to the receiver. Thus, in row R3, column C3, the first three bytes of the send buffer 68(a) have been sent. In row R3, column C1, the credit list builder/communicator 83 has received a request for receiving data in a new buffer 78(c) of size twenty-two. Since this buffer 78(c) has not been communicated to the sender, the credit list builder/communicator preferably updates the pointer Next to point to this buffer." [emphasis added]

Sending "the next seven bytes of the send buffer" is not the same as, for example. instructing the sender to transmit bytes 20 - 26. Again, FORIN fails to teach a critical step of Applicants' method.

The Examiner also states: "c) transmitting an additional, predetermined number of credits from said receiving node to said sending node when a predetermined event occurs, said additional, predetermined number of credits authorizing transmission of a second unique range of bytes of said byte stream. (column 23, lines 10 - 35)"

FORIN (column 23, lines 10 - 35) recites:

"The credit list builder/communicator 83 has received a request for receiving data into a new buffer 78(d) of **size** forty-four.

"In row R5, column C3, the sender is idle because it has no credits. In row R5, column C2, the receiver sends a credit message 82(b) containing **credits of twenty-two and forty-four** to the sender. In row R5, column C1, the pointer Rtrip is updated to point to the receive buffer 78(c) corresponding to the first credit in the new credit message 82(b). The credit list builder/communicator 83 sets the pointer Next to zero because there are no credits that have not been transmitted to the sender. The buffer 78(a) has been removed from the buffers available for receiving data because the descriptor for that buffer has been processed. The receive buffer 78(b) receives the data packet 84(b).

"In row R6, column C3, the sender receives the **credits twenty-two and forty-four**. The credit list reader/processor 75 posts a descriptor in the send queue to send **the next twenty-two bytes of the send buffer** 68(a). The credit list reader/processor 75 updates the buffer pointer PB. In row R6, column C1, the receiver removes the buffer 78(b) from the list of buffers available for receiving data since it previously received data.

"In row R7, column C2, the sender **sends a data packet 84(c) containing the next twenty-two bytes of the send buffer** 68(a). In row R7, column C3, the credit list reader/processor 75 removes the used credit of twenty-two from the credit list." [emphasis added]

Again, FORIN fails to teach the third of Applicants' three critical steps of the method. FORIN simply does not issue credits specifically addressed to a particular range of bytes in a stream of data to be transmitted. The absence of Applicants' unique feature in the FORIN system precludes the use of Applicants' technique of inferring credits for specific ranges of bytes to requested bytes when the transmission of a credit may have been lost. The FORIN system would not and could not determine that a credit transmission had been lost.

Claim 1 has been amended to recite step (d):

d) releasing at least a portion of said buffer corresponding to said first unique range of bytes upon occurrence of said predetermined event.

Releasing step (d) is not taught or suggested by FORIN.

For at least these reasons, instant claim 1 is not anticipated by FORIN and its rejection under 35 U.S.C. §102(e) is overcome.

With regard to claim 6, the specific teaching of FORIN is irrelevant as FORIN fails to teach any of steps (a) to (d) of Applicants' claim 1, from which claim 6 depends. If an

independent claim is not anticipated, a dependent claim can not be anticipated under 35 U.S.C. §102(e).

Likewise, similar arguments may be made for claims 7 - 15, 77, 78, and 81, all ultimately depending from claim 1. Consequently, Applicants believe that the amendment of claim 1 overcomes the rejection of claims 1, 6-15, 77, 78, and 81 as being anticipated under 35 U.S.C. §102(e) by FORIN.

Claims 16 - 27, 29, 31 - 45, 47 - 65, 67 - 76, 79 and 80 were rejected under 35 U.S.C. §103(a) as being unpatentable over FORIN in view of United States Patent No. 6,683,850 for METHOD AND APPARATUS FOR CONTROLLING THE FLOW OF DATA BETWEEN SERVERS, issued January 27, 2004 to David S. Dunning et al.

As discussed hereinabove, FORIN teaches a completely different system and method than that disclosed and claimed by Applicants. FORIN fails to teach or suggest a system wherein credits are associated with a SPECIFIC AND UNIQUE RANGE OF BYTES (i.e., a specific sub-string of bytes) selected from a stream of data to be transmitted from a sender to a receiver. This is a critical and fundamental difference between Applicants' method and that of FORIN.

DUNNING et al. describe the use of negative acknowledgements (NAKs) to instruct a transmitter to resend an indicated packet(s) AND any subsequent packets. The system and the method of the present invention uses NAKs to retransmit ONLY the data specified in the NAK packet. Any other data (e.g., subsequently transmitted data) is NOT retransmitted. This avoids bandwidth wastage due to potentially redundant transmissions as, in the DUNNING et al. system, some of the data transmitted "since then" (DUNNING et al. Abstract, line 29) may have been already received correctly.

When attempting to maximize transmission efficiency, especially across a less than ideal transmission path where frequent retransmission may be required, it is certainly advantageous to have a system that allows retransmission of

only improperly received data. Applicants provide such a system. Neither FORIN nor DUNNING et al, individually or in combination teach or suggest such a system. Indeed, such a system is not possible unless a particular byte or range of bytes may be uniquely identified and relocated in the byte stream to be transmitted. Neither FORIN nor DUNNING et al. provide a suggestion of Applicants' unique use of credits referring to unique byte ranges that makes possible such a system. Even if DUNNING et al. were motivated to incorporated the FORIN approach in their NAK system, the resulting system would not render Applicants' invention since the range of bytes is not considered in either reference. Adding the teaching of DUNNING et al. to that of FORIN in no way modifies that teaching to suggest Applicants' fundamentally different system. The previously discussed amendments are seen to overcome the rejection of claims 16 - 27, 29, 31 - 45, 47 - 65, 67 - 76, 79 and 80 under 35 U.S.C. §103(a) as being unpatentable over FORIN in view of DUNNING et al.

Claims 8, 28, 30, 46, and 66 were rejected under 35 U.S.C. §103(a) as being unpatentable over FORIN in view of DUNNING et al. and further in view of United States Patent No. 6,594,721 for APPROXIMATED PER-FLOW RATE LIMITING, issued April 20, 2004 to David R. Cheriton. CHERITON uses credits on a per-packet basis; every packet to be transmitted requires an explicit credit. This is completely different from Applicants' system wherein a credit packet authorizes transmission of many data packets. Consequently, Applicants' system has lower overhead for managing credits on both the receiving side and the transmitting side of the communications data path.

Further, the CHERITON system permits a packet to be transmitted even when sufficient credits are not available. When a packet is received, the size of the data in the packet is compared against a credit value maintained in a table at the receiver. If the packet's data size exceeds the credit value, the packet is dropped. As that packet must eventually be retransmitted, the CHERITON method requires additional bandwidth due to spurious transmissions. Applicants' novel

system, however, does not suffer from this disadvantage as no correctly received packet ever need be retransmitted; no packet is transmitted until sufficient credits are received by the transmitter.

Nothing in CHERITON suggests that a credit packet could authorize transmission of multiple packets as in Applicants' novel system. Neither does CHERITON teach or suggest that no packet be transmitted until sufficient credits are received. Consequently, combining the teaching of CHERITON to those of FORIN and DUNNING et al. as discussed hereinabove fails to suggest Applicants' novel approach to reliable, efficient data transmission, specifically a system based on credits issued for specific, unique ranges of bytes. The teaching of CHERITON simply does not suggest such as method, alone, or in combination with FORIN and/or DUNNING et al. Even if CHERITON was motivated to incorporated the FORIN and or DUNNING et al. approaches in his system, the resulting system would not render Applicants' invention since the range of bytes is not considered in any of the references.

Applicants believe that claims 1, 5 - 11, and 13 - 81, as amended, are now allowable and therefore respectfully request that they be allowed and the application passed to issue.

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